

# Section 3 - Resistance

## Voltage, Current and Resistance

In this section you can use the equation :

**voltage = current x resistance**

also written as:

$V = IR$

where  $V$  = voltage in volts (V)  
 $I$  = current in amps (A)  
 $R$  = resistance in ohms ( $\Omega$ ).

Use this value for  
mains voltage

Helpful Hint.

Many appliances run from **mains** voltage which is **230 V ac**.

Useful units for electricity are:

$$1 \mu\text{A} = 0.000\,001 \text{ A} = 1 \times 10^{-6} \text{ A}$$

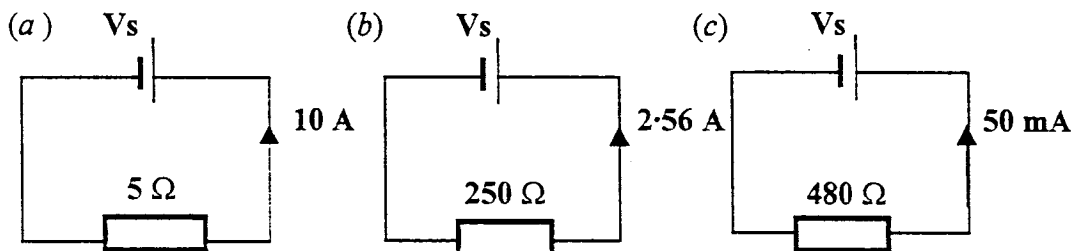
$$1 \text{ mA} = 0.001 \text{ A} = 1 \times 10^{-3} \text{ A}$$

Convert the current from  
milliAmps or microAmps  
into Amps before using  
Ohm's Law.

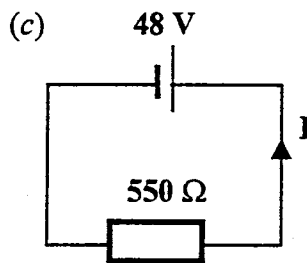
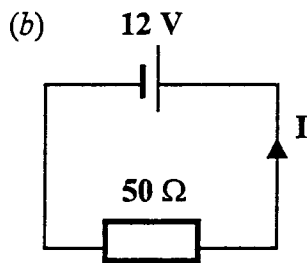
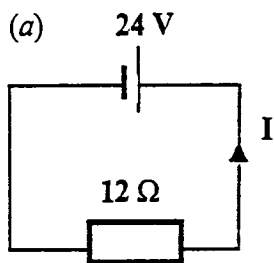
1. Find the missing values in the following table.

	<i>Voltage (V)</i>	<i>Current (A)</i>	<i>Resistance (<math>\Omega</math>)</i>
(a)		15	35
(b)		0.2	1 000
(c)	230		125
(d)	24		550
(e)	120	12	
(f)	6	$6.25 \times 10^{-3}$	

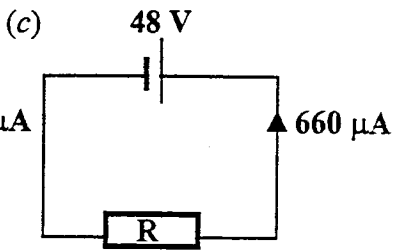
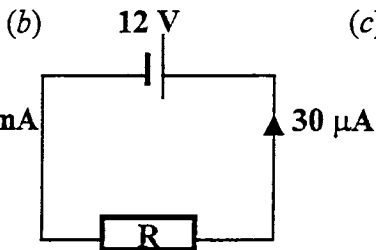
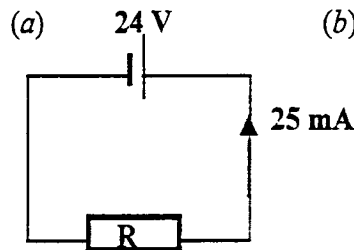
2. Look at the following circuits and calculate the supply voltage in each case :



3. Look at the following circuits and calculate the current in each case :

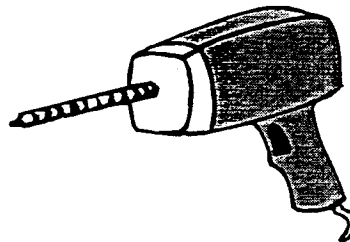


4. Look at the following circuits and calculate the unknown resistance in each case :



5. Calculate the resistance of a lamp if the current through it is 10 mA when operated by a 24 V supply.

6. A power drill is operated at mains voltage and has a resistance of  $1.5\text{ k}\Omega$ . Calculate the current through the drill.



7. The maximum current an electric motor can safely handle is 10 mA and it has a resistance of  $360\ \Omega$ . Calculate its safe operating voltage.

8. A cooker draws a maximum current of 28.75 A and has a resistance of  $8\ \Omega$ . At what voltage should it operate?

9. Hairdryers work from the mains voltage and can have currents of up to 15 mA flowing through them. Calculate the resistance of the hairdryer.

10. Over head cables have resistance of  $25\text{ k}\Omega$ . If the voltage across the cables is 4 000 V calculate the current through them.